Remarks

The claims have been reviewed and amended in view of the prior art and the Examiner's comments in the final Office Action dated April 4, 2005. Support for the amendments to the claims may be found at page 7 commencing at line 3, page 7 commencing at line 18, and page 8 commencing at line 23.

The present invention is directed to a composite metal seal ring, and particularly a metal seal ring which has a carbon steel body with an expansion coefficient that is substantially similar to the expansion coefficient of the first and second tubulars which are sealed by the metal seal ring. The Examiner notes that seal bodies have previously been made from carbon steel, and also from stainless steels which have an expansion coefficient which is significantly different from that of carbon steel. Applicant respectfully submits that one skilled in the art, looking to improve upon a metal seal ring of the type which has an expansion coefficient approximating that of the tubular members to be sealed, would not look to Stevenson, which discloses a stainless steel body, in order to devise a better seal ring. Stevenson is contrary to the present invention, which seeks to maintain approximately the coefficient of expansion of the composite metal seal ring as the first and second tubular members. Moreover, even if one looked to Stevenson, which discloses a seal ring made from stainless steel and not a carbon steel, the disclosure of Stevenson simply states that such a stainless steel ring can be coated with a suitable material, such as an electro deposited nickel plating over hard copper, or a welded overlay of a corrosion-resistant alloy. The sentence relied upon by the Examiner at page 3

commencing at line 54 of Stevenson indicates that the overlay is equally suitable to the coating. Such is clearly not the case, however, with the present seal ring. Claim 1 calls for at least one of a first and second inlay secured to the carbon steel body by welding and comprising a stainless steel and corrosion-resistant alloy, while dependent Claim 7 calls for the addition of a corrosion-resistant coating on the carbon steel body. As disclosed in the present application, the composite seal ring uses an inlay, and provides for the use of a coating on the carbon steel body in only selected cases.

Stevenson has been prior art for approximately 20 years, and metal sealing rings for sealing between first and second members formed from either a low carbon steel or stainless steel have been around for at least that time. Nothing in the prior art discloses or suggests, however, the benefits of utilizing a low carbon alloy metal body which has a coefficient of expansion approximating that of the members to be sealed, and at least one of a first and a second inlay secured to the body and formed from a material which does not approximate the expansion coefficient of the tubular members. Moreover, the benefits achieved with a composite sealing ring according to the present invention would not be achieved by the sealing ring of Stevenson, since a stainless steel body still has an expansion coefficient which is not similar to that of a low carbon steel.

The Examiner has further contended that the claims dealing with the thickness of the seal ring, namely Claims 4-6, 20-23 and 35-40, recite design choices for the thickness of the inlay. Nothing in the prior art discloses or suggests, however, attempting to restrict the inlay thickness and its volume relative to the volume of the metal body of the seal ring,

so that the composite seal ring coefficient of expansion retains the coefficient of expansion approximating that of the members being sealed by the seal ring. Since the prior art does not recognize this feature, inherently it cannot be merely a matter of design choice or routine engineering to provide a minimum thickness overlay or an overlay of a reduced volume. The Examiner has cited no references which disclose these ranges, and the recited ranges are significant if one understands the objective of the present invention, which is not recognized by the prior art, namely to supply a composite seal ring with a metal body having a coefficient of friction approximating that of the members being sealed, with a metal body having an overlay of a different material on its sealing surfaces to prolong the useful life of the seal.

In view of the above, reconsideration is requested.

Respectfully submitted,

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